# DIRECT TESTIMONY OF
# DANIEL F. KASSIS, P.E.
# ON BEHALF OF
# DOMINION ENERGY SOUTH CAROLINA, INC.
# DOCKET NO. 2021-88-E

**Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.**

A. My name is Daniel ("Danny") F. Kassis. My business address is 2392 West Aviation Avenue, North Charleston, South Carolina 29406. I am the General Manager of Strategic Partnerships & Renewable Energy, for Dominion Energy South Carolina, Inc. ("DESC"). My responsibilities include developing DESC's strategy for deploying and utilizing renewable assets consistent with state policy in the most efficient and beneficial manner to DESC's customers. I oversee customer facing solar and all renewable energy initiatives for DESC and am also responsible for negotiating and obtaining final approval for renewable energy purchase contracts for DESC. I have signed all purchase contracts for DESC under the Distributed Energy Resources Act, as well as numerous renewable resource power purchase agreements.

**Q. BRIEFLY STATE YOUR EDUCATION, BACKGROUND, AND EXPERIENCE.**

A. In 1984, while still a student, I began working for DESC, then South Carolina Electric & Gas Company ("SCE&G"), as an Engineering Student Assistant.[1] In 1986, I received a Bachelor of Science degree in Mechanical Engineering from Clemson University, and I am licensed in South Carolina as a Professional Engineer. Upon graduation, I began working at the Charleston Naval Shipyard in the navy's nuclear submarine program. In 1987, I rejoined SCE&G and served in various roles in the Gas Department, eventually becoming the Manager of the Charleston Division. In 1998, I was named as the District Manager for the Electric Department in the Charleston District. In 2004, I was promoted to the position of General Manager of Electric Service Coordination. In this position, I coordinated all of the areas that supported the retail electric operations for SCE&G. In 2013, I was promoted to the position of Vice President of Customer Service, and I became the Vice President of Customer Relations and Renewables in 2014 with the addition of renewable energy programs and energy efficiency programs under my responsibility. Finally, just earlier this year, my title changed to General Manager of Strategic Partnerships and Renewable Energy.

**Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA (THE "COMMISSION")?**

[1] In April of 2019, SCE&G changed its name to DESC.

A. Yes, I previously appeared before the Commission and testified in the following dockets:

- Docket No. 2019-184-E (DESC's avoided cost docket);
- Docket No. 2019-365-E (generic competitive procurement docket);
- Docket No. 2019-393-E (DESC's Storage Tariff docket) (pre-filed testimony); and
- Docket No. 2020-229-E (DESC's Solar Choice Tariff docket).

In addition, I participated in a permissible ex-parte briefing regarding vegetation management and undergrounding electric utility lines in ND-2020-27-E.

**Q. PLEASE STATE THE PURPOSE OF THIS DOCKETED PROCEEDING.**

A. S.C. Code Ann. § 58-41-20, as implement by S.C. Act No. 62 of 2019 ("Act No. 62"), provides that:

> As soon as is practicable after the effective date of this chapter, the commission shall open a docket for the purpose of establishing each electrical utility's standard offer, avoided cost methodologies, form contract power purchase agreements, commitment to sell forms, and any other terms or conditions necessary to implement this section.

The Commission most recently addressed these issues in Docket No. 2019-184-E and approved DESC's current avoided cost methodology, form power purchase agreement (the "Form PPA"), standard offer contract (the "Standard Offer"), and notice of commitment to sell form ("NOC Form"). S.C. Code Ann. § 58-41-20 also requires the Commission review and approve these items at least once every 24 months. The Commission established this docket to perform such 24-month review.

**Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

A. Act No. 62 requires jurisdictional electric utilities to establish "standard offer [contracts], avoided cost methodologies, form contract power purchase agreements, commitment to sell forms" and other such terms and conditions to implement the requirements of § 58-41-20(A). The above requirements in Act No. 62 are, in part, how South Carolina implements the Public Utilities Regulatory Policies Act of 1978 ("PURPA").

The purpose of my testimony to provide a brief overview of PURPA and how those requirements relate to Act No. 62 and this docket specifically. I will also provide testimony regarding customer protections and how to balance the needs of customers with the requirements of PURPA. Finally, I will discuss current market conditions related to PURPA, Act No. 62, and how DESC plans to contribute towards Dominion Energy, Inc.'s[2] ambitious carbon neutral goal.

**Q. PLEASE INTRODUCE DESC'S WITNESSES AND PROVIDE AN OVERVIEW OF THEIR TESTIMONY IN THIS DOCKET.**

A. **John E. "Eddie" Folsom, Jr.**, Senior Market Originator for DESC who will discuss limited revisions to DESC's currently-effective template Form PPA,

[2] As discussed below, Dominion Energy, Inc. is DESC's parent company.

Standard Offer, and NOC Form (collectively, the "Act No. 62 Documents") which were approved by the Commission in Docket No. 2019-184-E.

**James W. Neely, P.E.**, Energy Market Consultant for DESC, who will discuss DESC's avoided costs for power purchases under the under PURPA; the long-run avoided costs for qualifying facilities under PURPA (each, a "QF") with production capacity up to 2 MW; the short-run avoided costs for QFs with production capacity less than or equal to 100 kW; and DESC's proposal to continue calculating a project-specific avoided cost for QFs with production capacity greater than 2 MW.

**Peter David.**, Associate Director at Guidehouse Consulting, Inc. ("Guidehouse"), who will discuss the Variable Integration Cost ("VIC") study and VIC calculation that was prepared by Guidehouse on behalf of DESC.

**Eric H. Bell**, **P.E.**, Manager—Electric Market Operations for DESC, who will discuss DESC's operational experience relating to additional costs arising from the supply of energy to its system by solar facilities interconnected with the system; matters pertaining to the Guidehouse VIC study, including application of the VIC to rates for solar facilities with a production capacity less than or equal to 2 MW; the proposed Time-of-Production Avoided Costs Rate for QFs with production capacity less than or equal to 2 MW; and use of the Energy Exemplar PLEXOS model used to calculate the avoided costs in this docket.

**Allen W. Rooks**, Manager of Regulation for DESC, who will sponsor DESC's rate schedules that are being updated or proposed in connection with this proceeding.

## OVERVIEW OF ACT NO. 62 AND PURPA

**Q. ARE ACT NO. 62'S REQUIREMENTS TO ESTABLISH "STANDARD OFFER [CONTRACTS], AVOIDED COST METHODOLOGIES, FORM CONTRACT POWER PURCHASE AGREEMENTS, COMMITMENT TO SELL FORMS" DIRECTLY RELATED TO PURPA?**

A. Yes. This is in part South Carolina's on-going implementation of PURPA and represents rates, forms, and contracts available to QFs. Generally speaking, to qualify as a QF under PURPA, the (i) generator just has to use a renewable fuel source, such as wind, solar, biomass or the like, and (ii) facility must not exceed 80 megawatts AC ("MW-AC"). Among other things, PURPA contains a mandatory purchase obligation related to the power supplied by these QFs, sometimes referred to as the "the PURPA put" or just "put." As implemented pursuant to the Federal Energy Regulatory Commission's ("FERC") Order No. 69, utilities are required to purchase power from the QF at rates that do not exceed the utility's avoided cost. This mandatory purchase can be established through sales made (i) on an as-available basis or (ii) under a long-term agreement, which can take the shape of a (a) long-term power purchase contract, (b) a standard offer agreement which has standardized rates and terms for smaller projects up to 100 kilowatts ("kW"), or (c) binding, non-contractual relationship, or "LEO", as described below. Although the utility must purchase this power from eligible QFs, the FERC has made clear that such rates must be nondiscriminatory to QFs, while at the same time being just and reasonable to customers to ensure that customers do not subsidize these QFs.[3]

**Q. PLEASE PROVIDE A BRIEF OVERVIEW OF PURPA.**

A. PURPA was passed during the oil embargo and natural gas shortage of the 1970s. PURPA was enacted to promote:

- The conservation of electric energy;
- Increased efficiency in the use of facilities and resources by electric utilities;
- Equitable retail rates for electric consumers;
- Expeditious development of hydroelectric potential at existing small dams; and
- Conservation of natural gas while ensuring that rates to natural gas consumers are equitable.

As I discuss in greater detail below, PURPA has been reformed several times since its enaction to account for changes in the marketplace and industry as a whole.

[3] *See, e.g.*, Order No. 872.

**Q. DOES PURPA IMPOSE REQUIREMENTS UPON UTILITIES IN ADDITION TO THE MUST-PURCHASE OBLIGATION YOU DESCRIBED ABOVE?**

A. Yes. Via Order No. 69[4] which implemented PURPA, the FERC imposed two other primary requirements upon utilities. Utilities must:

- Provide QFs with interconnection service;
- Provide backup electric energy to QFs on a non-discriminatory basis and at just and reasonable rates.

**Q. DOES PURPA PROVIDE QFs WITH BENEFITS IN ADDITION TO THOSE YOU OUTLINED ABOVE?**

A. Yes. PURPA also largely exempts QFs from federal and state utility regulation. The FERC regulates rates and services for wholesale sales of electricity and electric transmission in interstate commerce, while states regulate the local distribution of electric energy and retail sales of electric energy to customers or "end users." The sale of energy from an independent generator to a public utility is a wholesale sale and is otherwise subject to FERC regulation. Depending on the size of the plant, PURPA exempts QFs from most of the Federal Power Act and Public Utilities Holding Company Act of 2005. Additionally, PURPA exempts QFs from

[4] *Small Power Production and Cogeneration Facilities; Regulations Implementing Section 210 of the Public Utility Regulatory Policies Act of 1978*, Order No. 69, FERC Stats. & Regs. ¶ 30,128 (1980) ("Order No. 69").

certain state laws and regulations respecting rates as well as financial and organizational aspects of utilities.

**Q. HAVE THERE BEEN FEDERAL REFORMS OF PURPA SINCE IT WAS ENACTED IN 1978?**

A. Yes, there have been various federal legislative and regulatory reforms of PURPA since its enactment, including as recently as July of 2020 via Order No. 872 and its progeny.[5] Through Order No. 872 and the following orders, the FERC's reform efforts within Order No. 872 focused on a broad array of topics, including avoided cost caps, the "one-mile rule," and standards to secure a LEO.[6] The FERC stated that these modifications were necessary based on "demonstrated changes in circumstances that took place after the PURPA Regulations were first adopted."[7] Although Order No. 872 discussed a wide range of topics, my testimony will focus upon the provisions related to avoided costs specific consumer protections. In this regard, Order No. 872 primarily modified PURPA in three ways.[8] First, the FERC provided states with the flexibility to require that energy rates (but not capacity rates) in QF contracts (and LEOs) vary in accordance with changes in the purchasing electric utility's as-available avoided costs at the time the

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[5] *Qualifying Facility Rates and Requirements Implementation Issues Under the Public Utility Regulatory Policies Act of 1978*, Order No. 872, 85 FR 54638 (Sep. 2, 2020), 172 FERC ¶ 61,041 (2020) ("Order No. 872").
[6] *See id*.
[7] Order No. 872 at P. 20.
[8] DESC has not chosen to implement in this docket every option provided to utilities via Order No. 872 with respect to avoided costs given that many of the options impact a broad array of interests and would be more properly addressed via a stakeholder process rather than via this docket—particularly given the recency of the Order.

energy is delivered.[9] A QF no longer would have the ability to elect to have its energy rate be fixed but would continue to be entitled to a fixed capacity rate for the term of the contract or LEO if its state implemented such varying rates. Order No. 872 also permits states to allow QFs to have a fixed energy rate.[10] However, such state-authorized fixed energy rate can be based on projected energy prices during the term of a QF's contract based on the anticipated dates of delivery. Lastly, the FERC granted states flexibility to set "as-available" QF energy rates based on market forces. The FERC established a rebuttable presumption that the locational marginal price established in the organized electric markets[11] represents the as-available avoided costs of energy for electric utilities located in these markets. As for QFs that sell to electric utilities located outside of the organized electric markets[12], the FERC permitted states to set as available energy avoided cost rates at competitive prices from liquid market hubs or calculated from a formula based on natural gas price indices and specified heat rates. However, the states must first determine that such prices represent the purchasing electric utilities' energy avoided costs.

[9] *See id*.
[10] *See id*.
[11] As defined in 18 CFR 292.309(e), (f), or (g).
[12] As defined in 18 CFR 292.309(e), (f), or (g).

## PURPA PROJECTS IN SOUTH CAROLINA

**Q. PLEASE DESCRIBE YOUR INVOLVEMENT ON BEHALF OF DESC WITH PURPA PROJECTS.**

A. I am the senior manager for the DESC unit that works directly with QFs and negotiates these PPAs. As a manager, I have witnessed this substantial growth first-hand and I am the signatory on almost 1,000 MW of utility-scale renewable QF purchase contracts.

**Q. PLEASE DESCRIBE DESC'S EXPERIENCE WITH PURPA PROJECTS.**

A. Historically, DESC received relatively few PURPA projects—the ones it did receive were typically related to an industrial customer wanting to self-build to meet its needs while optimizing the investment by selling excess power to DESC. However, influenced by the existence of the Federal tax credits, the passing of Act 236 in 2014 and now Act No. 62, and the continued downward trends in the cost to construct solar facilities, there has been a tremendous increase in intermittent, solar generation on the DESC system in recent years. PURPA has become a mechanism by which developers can develop utility-scale plants where the utility is mandated to purchase 100 percent of the output at or below its avoided costs.

**Q. DO YOU BELIEVE PURPA HAS BEEN A DRIVER OF SOLAR GROWTH IN SC?**

A. Yes, PURPA is a key reason for the increase in solar generation in South Carolina and on the DESC system—particularly utility-scale solar. As you might expect, DESC, like other utilities around the country, has received more inquiries in recent years from QFs interested in developing projects and putting power to DESC. For example, in the summer of 2019, the nameplate capacity of utility-scale solar generation on the DESC system was approximately 498 MW. For the summer of 2020, the nameplate capacity of utility-scale solar generation on the DESC system was approximately 863 MW—an approximately 75% increase year-over-year—with utility-scale solar generation capacity alone expected to exceed 1,000 MW in the near future. In total, there are 3,832 MW of additional planned solar and/or energy storage projects pending in DESC's state and federal queue. To put this in perspective, DESC's highest recorded daytime system load was 4,926 MW on August 10, 2007, while DESC's average daily peak load is less than 3,300 MW. DESC has an additional 800 MW of environmentally-friendly hydro-generating stations including 576 MW of pumped storage.

**Q. PLEASE PROVIDE AN OVERVIEW OF THE CURRENT INSTALLED SOLAR QF CAPACITY ON DESC'S SYSTEM—AS WELL AS THE CAPACITY UNDER EXECUTED PPAs—THAT HAVE NOT YET REACHED COMMERCIAL OPERATION.**

A. Today, DESC has over 1,000 MW of solar photovoltaic generation systems comprised of residential, commercial, utility scale and community solar. DESC recently executed a 10-year PPA for a solar PV generation facility with an energy storage system, which was filed with the Commission on June 4, 2021. The generating plant can deliver a maximum of 73.6 MW. The energy storage system has a capacity of 18 MW and is designed to operate for four hours. The maximum total energy (PV and/or energy storage) that may be delivered simultaneously is 73.6 MW.

**Q. WILL PURPA DRIVE THE DEMAND FOR SOLAR GOING FORWARD?**

A. No, DESC is committed to meeting its carbon reduction goal and that drives its demand for renewable generation such as solar. Going forward, other considerations such as coal retirements and carbon reduction goals will drive the need for new resources including renewables, storage and natural gas-fired generation. DESC is committed to employing renewable resources, decommissioning older plants, reducing carbon emissions, and integrating emerging technologies that present reasonable long-term solutions by providing environmental benefits while also addressing safety and reliability issues. On these issues, DESC draws from a solid track record with regard to renewable generation. For example, DESC's parent company, Dominion Energy, Inc., announced last year that it intends to achieve net-zero emissions by 2050. Likewise, DESC has received numerous awards recognizing its specific commitment to renewable energy. Finally, the Dominion Energy Innovation Center houses the Duke Energy eGRID, an electrical grid simulator, and the world's most-advanced wind-turbine drivetrain testing facility. The two labs allow for important research to develop solutions to the challenges resulting from the additional adoption of variable energy resources and to approximate the level of response required to mitigate the impact of renewables to the electrical system.

Regardless of PURPA, DESC will plan for and incorporate solar power as well as other renewable resources and emerging technologies—including but not limited to renewable generation, energy storage, together or independently—in accordance with the IRP process to address customer needs in a reliable and economic manner. The question going forward is not whether there will be renewable resources and emerging technologies, but whether the incorporation of renewable resources and emerging technologies will be done in a way that meets DESC customer needs in the most reliable and economic manner.

## REALITIES OF PURCHASING UNDER PURPA

**Q. HOW DOES PURCHASING POWER FROM PURPA QFs DIFFER FROM UTILITY-OWNED GENERATION AND MARKET-DRIVEN WHOLESALE PURCHASED POWER?**

A. The underlying goals of these transactions are fundamentally different. A QF developer is typically only focused upon meeting its financial goals with respect to cost and revenues (utility's avoided cost). These decisions typically only account for customer needs or impact to the DESC system in a limited regard, if at all. As I mentioned above, QFs are able to sell power to DESC through PURPA's "must-purchase" obligation. This means DESC has little ability to shape or design the purchase to address a particular need of DESC's customers or DESC's reliability requirements. A QF may sell power to DESC during periods when DESC does not need the power.

Conversely, when DESC adds or purchases generation, it does so to meet identified customer needs in the most economic and reliable manner. Likewise, when DESC self-builds or purchases power in the market, it is doing so to address specific needs and negotiates one or more products to best fit those needs.

**Q. DOES THE MANDATORY PURCHASE OBLIGATION UNDER PURPA CONTAIN AN EXCEPTION IF SUCH PURCHASE DOES NOT MEET DESC'S SPECIFIC NEEDS?**

A. No, it does not. For example, DESC has added a significant amount of variable solar and it now drives the dispatch of the system because DESC must account for such variable solar both during the hours it is generating and hours it is not generating. Despite this, DESC is still subject to PURPA and must purchase more variable solar as long as QFs continue to add additional resources and deliver power onto the DESC system. This is true despite the fact that DESC did not identify a need in its IRP for long-term generating capacity or energy arising from new solar assets until around 2026.

**Q. DOES DESC HAVE AN IDENTIFIED NEED FOR ASSETS IN ADDITION TO SOLAR GENERATORS?**

A. Yes, particularly in light of the significant level of solar penetration on the DESC system, DESC also needs resources that operate when solar is not available—on winter mornings and during evening peaks, for example. Because of this, DESC needs resources that are fast-starting and dispatchable to mitigate the impact that this current level of variable resources have on the DESC system. As I discuss below, energy storage can help address current system needs—particularly short-term needs associated with the current penetration of variable solar generation, which requires quick-response resources to address intermittency. However, with the current duration limits, energy storage as it exists today will not, on its own, allow DESC to achieve its ambitious carbon neutrality goals. Finally, even without current QF generation levels, DESC from time-to-time needs energy to be delivered at a particular interface or a specific geographic point on its system to promote reliability, which may not align with where a QF developer would choose to site its project and inject power.

**Q. IF A UTILITY "MUST PURCHASE" THE OUTPUT OF A QF UNDER PURPA, DOES IT HAVE ANY ABILITY TO CURTAIL THE QF?**

A. Generally, a utility may curtail a QF. However, unless otherwise agreed to in the PPA, a utility must pay such QF for the power it would have otherwise delivered unless the curtailment was necessary to avoid or otherwise respond to a "system emergency." This is particularly relevant to DESC because—as stated above—utility-scale solar QF generation can comprise almost 40% of certain hourly loads.

**Q. WITH THE SIGNIFICANT AMOUNT QF GENERATION ON THE DESC SYSTEM, HAS DESC HAD TO DEPART FROM ITS ECONOMIC DISPATCH MODEL AND REDUCE ITS GENERATION ASSETS OUT OF ECONOMIC ORDER TO ACCOMMODATE SOLAR QF ENERGY DURING MILDER SHOULDER MONTHS?**

A. Yes. As stated above, unless otherwise provided for in the PPA, PURPA only allows curtailment without payment to avoid or address a system emergency. DESC continues to plan and execute economic dispatch of all system resources—which requires DESC to plan and operate around the must-purchase delivery of QF power. As a result, DESC often reduces output of utility-owned assets that have a lower variable cost than the QF in those low load hours. Sometimes, as a result of the QF power, DESC must shut down low-cost flexible generation, which creates higher operational costs. Other than during reliability events, DESC will plan and dispatch units—even lower-cost units—around these must-purchase PURPA energy resources.

**Q. HAS DESC HAD TO DEPART FROM ITS ECONOMIC DISPATCH MODEL AND REDUCE ITS GENERATION ASSETS OUT OF ECONOMIC ORDER TO ACCOMMODATE SOLAR QF ENERGY DURING HIGHER PEAK WINTER MONTHS?**

A. Yes. In fact, one such situation occurred during the CPRE hearing (Docket No. 2019-365-E) earlier this year and I provided testimony at the CPRE hearing regarding the same. At a high level, on January 28, 2021, load on the DESC system was lower than forecasted and solar generation on the DESC system was higher than forecasted. DESC System Control used Fairfield Pumped Storage and Lake Monticello to their full extent and all system generators were reduced to their lowest reliable operating limits. DESC System Control shut down one unit at Jasper (163 MW) but could not shut down more units due to forecasted evening and next morning loads. As a last resort, DESC System Control curtailed approximately 280 MW of solar generation through its approved procedure. DESC System Control released the curtailment order as soon as it was able to do so. Total curtailment time was about 1.5 hours. Additional "must-purchase" solar will only make situations like this more frequent.

**Q. DOES PURPA'S "MUST-PURCHASE" OBLIGATION IMPACT DESC'S NEED FOR RESERVES?**

A. Yes. The addition of solar generators via PURPA creates added reliability concerns and issues on the DESC system, which require DESC to maintain additional operating reserves to ensure reliability and guard against the possibility of an unacceptable shortfall in such reserves. For example, stand-alone solar QFs can have frequent, unplanned drops in generation that exceed 75% of their nameplate ratings. Typically, these unplanned drops are highly correlated to large drops in generation across other solar QFs, creating reliability consequences on the DESC system. The additional reserves ensure that DESC is prepared for these large, unplanned drops in generation such that DESC's overall ability to reliably serve customers and balance the DESC system is not adversely affected. However, maintaining these reserves necessarily results in additional costs. To prevent DESC's customers from being responsible for those additional costs, the solar generators are responsible for paying for those additional costs through variable integration charges, as discussed below.

## CONSUMER PROTECTIONS UNDER PURPA AND ACT NO. 62

**Q. HOW DOES ACT NO. 62 EVIDENCE A CONCERN FOR THE INTERESTS OF DESC'S CUSTOMERS?**

A. Section 58-41-20 of Act No. 62 provides, "[a]ny decisions by the Commission shall be <u>just and reasonable to the ratepayers</u> of the electrical utility, in the public interest, consistent with PURPA and the Federal Energy Regulatory Commission's implementing regulations and orders, and nondiscriminatory to small power producers; and shall strive to reduce the risk placed on the using and consuming public."

**Q. IS THERE SIMILAR LANGUAGE WITHIN PURPA?**

A. Yes. Initially, Sections 210(b)(1) and (b)(2) of PURPA provide that QF rates "shall be just and reasonable to the electric consumers of the electric utility and in the public interest" and "shall not discriminate against qualifying cogenerators or qualifying small power producers." Congress intended its requirement that PURPA purchases occur at or below avoided costs to serve as a customer protection. If a utility purchases energy from a QF that would reduce its energy cost or would avoid purchasing energy from another utility, the rate for purchase from the QF should be based on the energy cost that the utility avoids. As discussed above, the FERC recently re-iterated that the rates paid to QFs should accurately reflect the avoided costs, and Act No. 62 specifically expresses the same concern, noting that "rates for purchase of energy and capacity fully and accurately reflect the electrical utility's avoided cost rates."[13] This is a critically important concept.

Additionally, rates may differentiate among QFs using various technologies and vary by resources. As a utility adds more generation, particularly generation that has an operating profile similar to existing intermittent supply, it is less able to avoid costs and therefore the avoided cost value must decline. Finally, Congress limited the size of small power production QF facilities to 80 MW and provided state's with broad authority to implement PURPA in a manner that serves each state's unique needs and circumstances. These protections are consistent with the requirement in Act No. 62 that "any [C]ommission decision. . .shall strive to reduce the risk placed on the using and consuming public."[14] Clearly, customer interests are a critical consideration when implementing PURPA—whether at the federal of state level.

**Q. DID THE FERC RECENTLY ADOPT REFORMS TO PROVIDE GREATER CUSTOMER PROTECTIONS FROM RATES WHICH EXCEED THE UTILITY'S AVOIDED COSTS?**

A. Yes. Specifically, the FERC stated that the modifications to PURPA within Order No. 872 were primarily based upon "demonstrated changes in circumstances that took place after the PURPA Regulations were first adopted, to ensure that the

[13] S.C. Code Ann. § 58-41-20(B)(1).
[14] S.C. Code Ann. § 58-41-20(A).

regulations continue to comply with PURPA's statutory requirements established by Congress."[15] The FERC's explanation of these "demonstrated changes" evidence a fundamental concern for customers.

**Q. PLEASE BRIEFLY DESCRIBE SOME OF THE "DEMONSTRATED CHANGES" THE FERC OBSERVED THAT DROVE THE REFORM EFFORTS UNDER ORDER NO. 872.**

A. First and foremost, the FERC cited evidence undercutting a critical assumption that was made at the time PURPA was enacted—that assumption was that "over- and under-recovery in rates compared to avoided cost 'will balance out.'"[16] Specifically, the FERC noted that this assumption was critical to the FERC's holding in 1980 "that the fixed and capacity rate option applicable to long-term contracts and other legally enforceable obligations did not violate the statutory avoided cost caps on QF rates."[17] However, since PURPA's implementation in 1980, the FERC noted in Order No. 872 that evidence demonstrates that such recovery will not always balance out, and cited evidence "demonstrating that overestimations of avoided cost have not been balanced by underestimations, and that this trend may persist with the general decline in the cost of electricity."[18] The

[15] Order No. 872-A at P. 10
[16] Order No. 872 at P. 21.
[17] *Id*.
[18] Order No. 872 at P. 55. For example, testimony was provided in the CPRE docket (Docket No. 2019-365-E) that between 2012 and 2017, the PURPA framework within North Carolina "resulted in contracts that cost approximately $1 billion more than the current forecast of avoided cost over the remaining term of the contracts." Direct Testimony of George V. Brown, p. 5, filed in Docket No. 2019-365-E on February 22, 2021.

FERC made clear that neither PURPA nor the FERC intends for ratepayers to subsidize QF generation through inaccurate, inflated avoided cost rates.[19] Furthermore, the FERC noted that QFs have only made up 10-20% of all renewable resource capacity in service in the United States since 2005.[20] The FERC suggested that QFs may no longer need to exclusively rely on this avoided-cost structure under PURPA, while noting that QFs are "equally as well positioned as non-QF independent generators to take advantage of federal and state incentives designed to encourage the construction of renewable resources."[21] As such, the FERC's efforts under Order No. 872 aimed to address these realities via various reforms—including providing states with the flexibility to ensure QF rates do not exceed the statutory maximum rate established by Congress.[22]

**Q. IF NECESSARY TO PROTECT CUSTOMERS, EVEN WITH THE AVOIDED COSTS REFORMS DESCRIBED ABOVE, MAY DESC SIMPLY MAKE A FILING WITH THE FERC OR THE COMMISSION SEEKING TO BE RELIEVED OF PURPA'S MANDATORY PURCHASE OBLIGATION?**

A. No. There is no mechanism available to DESC to exempt it from PURPA or otherwise terminate PURPA's mandatory purchase obligation. DESC must rely on

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[19] *See* Order No. 872 at P. 254.
[20] *Id.* at P. 240.
[21] *Id.* at P. 242.
[22] *Id.*

the size limits of PURPA and the Commission approving a methodology to accurately calculate avoided cost rates to measure the costs the utility avoids rather than the higher costs the QF developers seek for their projects.

**Q. ARE THERE MECHANISMS UNDER PURPA VIA WHICH A UTILITY CAN TERMINATE THE MUST-PURCHASE OBLIGATION UNDER PURPA?**

A. Yes, the FERC has identified limited scenarios that are currently inapplicable in South Carolina. For example, where a utility can demonstrate to the FERC that QFs have nondiscriminatory access to markets to sell energy and capacity, the utility may petition the FERC to excuse the utility from PURPA's mandatory purchase obligation.[23] However, the FERC established a rebuttable presumption in Order No. 872 that QFs 5 MW or below do not have nondiscriminatory access to such markets. Likewise, Order No. 872 established certain factors that QFs between 5 MW and 20 MW "can point to in seeking to rebut the presumption that they have nondiscriminatory access."[24] DESC has not joined an organized market, which is largely regulated by the FERC. However, even if DESC was part of an organized market, it may still be required to purchase projects sized 5 MW and smaller.

[23] *See, e.g.*, 18 C.F.R. § 292.310.
[24] Order No. 872 at P. 640.

## AVOIDED COSTS UNDER PURPA

**Q. PLEASE EXPLAIN THE CONCEPT OF THE UTILITY PAYING ITS AVOIDED COST RATE.**

A. DESC Witnesses Bell and Neely explain DESC's methodology to calculate DESC's avoided costs. While they provide a detailed explanation of the methodology and calculation, I will discuss the concept of a utility's avoided cost—specifically how it relates to its "must-purchase" obligation. As discussed in DESC's Application, PURPA defines "incremental cost of alternative electric energy" as "the cost to the electric utility of the electric energy which, but for the purchase from such cogenerator or small power producer, such utility would generate or purchase from another source."[25] Congress intended the avoided cost to serve as a cap on the rates utilities are required to pay: "No such rule prescribed under subsection (a) *shall provide for a rate which exceeds the incremental cost to the electric utility of alternative electric energy*."[26] The Conference Report for PURPA states:

> [T]he utility would not be required to purchase electric energy from a qualifying cogeneration or small power production facility *at a rate which exceeds the lower of* the rate described above, namely a rate which is just and reasonable to consumers of the utility, in the public interest, and nondiscriminatory, or the incremental cost of alternate electric energy. This limitation on the rates which may be required in purchasing from a cogenerator or small power producer *is meant to act as an upper limit on the price* at which utilities can be required under this section to purchase electric energy.[27]

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[25] 16 U.S.C. 824a-3(d).
[26] 16 U.S.C. 824a-3(b) (emphasis added).
[27] H.R. Rep. No. 95-1750, at 98 (1978) (emphasis added).

**Q. BRIEFLY EXPLAIN WHY THE UTILITY PAYS UP TO AVOIDED COST.**

A. As defined by both PURPA regulations and Act No. 62, "avoided costs" are "the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase from [QFs], such utility would generate itself or purchase from another source."[28] Specifically, "[e]nergy costs are the variable costs associated with the production of electric energy (kilowatt-hours). They represent the cost of fuel, and some operating and maintenance expenses. Capacity costs are the costs associated with providing the capability to deliver energy; they consist primarily of the capital costs of facilities."[29] Importantly, section 210(b) of PURPA does not allow for a rate which exceeds the incremental cost to the electric utility of alternative electric energy.[30] PURPA then defines "incremental cost of alternative electric energy" as "the cost to the electric utility of the electric energy which, but for the purchase from such cogenerator or small power producer, such utility would generate or purchase from another source."[31] In summary, PURPA's implementing regulations also expressly provide that "[n]othing … requires any electric utility to pay more than the avoided costs for purchases" from QFs.[32] As such, the FERC and PURPA make clear that avoided costs are <u>not</u> calculated based on developer needs

[28] 18 C.F.R. § 292.101(b)(6); S.C. Code Ann. § 58-41-10(2).
[29] Order No. 69 at P. 12,216.
[30] 16 U.S.C. § 824a-3(b).
[31] 16 U.S.C. § 824a-3(d).
[32] 18 C.F.R. § 292.304(a)(2).

to incentivize more QF projects. Instead, it is clear that avoided cost is based upon the utility's cost and avoided costs, which will necessarily go down as more QF resources with the same or similar generation profile are added to DESC's supply portfolio.

**Q. ARE QFs EXEMPT FROM CERTAIN FEDERAL AND STATE COMMISSION RATE-MAKING REGULATIONS AND SIMILAR OVERSIGHT?**

A. Yes. As described above—depending on the size of the plant—PURPA exempts QFs from most of the Federal Power Act and Public Utilities Holding Company Act of 2005, including those state laws and regulations respecting the rates and financial and organizational aspects of utilities.

**Q. CAN A UTILITY COMMISSION MODIFY RATES DURING THE TERM OF A PPA AS A CONSUMER PROTECTION MEASURE?**

A. No, if a QF executes a long-term PPA with fixed rates for the duration of the contract, the Commission may not review and later revise those rates for the duration of the PPA because PURPA exempts QFs from state regulation of electric utility rates. If customers are overpaying under long-term, fixed-fee PPAs, the utility commission cannot step in an adjust rates to protect consumer. It must establish an accurate methodology and rates from the start.

**Q. WHAT IS THE CURRENT COMMISSION-APPROVED PPA TERM FOR DESC?**

A. The Commission approved a minimum 10-year term for the Form PPA and Standard Offer in Docket No. 2019-184-E.

**Q. IS DESC SEEKING TO REDUCE THE CURRENT PPA TERM OF 10 YEARS?**

A. No. This was a negotiated term specified in Docket No. 2019-184-E and it strikes a balance between customer interests and QF developer interests. In the last 12 months alone, four solar QFs with 10-year initial term PPAs reached commercial operation, and another is planning to achieve commercial operation in early 2022. DESC also recently executed a PPA with a 10-year term and is actively negotiating others. Because the avoided cost rate provided in a PPA may not be reviewed after the PPA is executed, ten years strikes an appropriate balance and fulfills Act No. 62's directive that any:

> [D]ecisions by the commission shall be just and reasonable to the ratepayers of the electrical utility, in the public interest, consistent with PURPA and the Federal Energy Regulatory Commission's implementing regulations and orders, and nondiscriminatory to small power producers; and shall strive to reduce the risk placed on the using and consuming public.

S. C. Code Ann. § 58-41-20(A).

## OPERATING ISSUES

**Q. PLEASE EXPLAIN THE CONCEPT OF GENERATOR OPERATING ISSUES.**

A. Operating issues is a generic term that can refer to problems including, but not limited to, the following:

- Power quality (including voltage, reactive power, and stability);
- Operator error;
- Equipment failure (electrical equipment, mechanical, or controls); and
- Equipment damage

Additionally, these issues can vary from generator to generator given that generator-specific characteristics impact the quality of its operation, including:

- Appropriateness of design;
- Maintenance planning and operational execution; and
- Quality of construction (including key components, such as inverters and tracker structures).

**Q. WHAT TYPE OF CHALLENGES ARE PRESENTED BY THESE OPERATING ISSUES?**

A. At a high level, these generator operating issues present a broad range of operating challenges, regardless of whether the generator is base load generation, peaking generation, or intermittent generation. For generators that are connected to the grid, operating issues have a particular importance because they relate to the utility's ability to maintain safety, reliability, and regulatory compliance. Mitigating operating issues requires regular maintenance and an accompanying financial commitment to ensure reliability. Routine maintenance and a dedication to committing resources every year can improve the operation of the plant and often mitigate larger issues in the future. Additionally, safely and reliably providing electric service to retail-consuming customers requires significant planning and coordination and operation of assets to manage system dynamics that change in real-time.

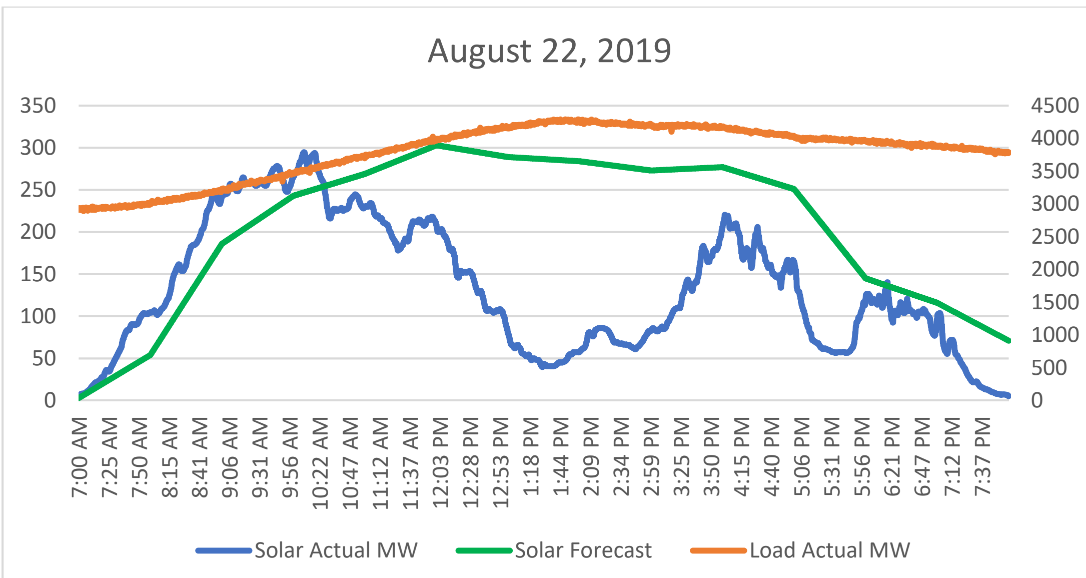
**Q. COULD SYSTEM CONDITIONS OR SYSTEM OPERATIONS IMPACT A PLANT'S RELIABILITY?**

A. While the design, construction, and maintenance of a plant may impact that particular plant's operating performance, a generator may also be impacted by the performance of other generators on the same system. For example, intermittent assets can present operating issues not common to other assets, such as dramatic spikes and drops in generator output over a short period of time due to these generators' dependency upon weather patterns.

**Q. CAN YOU PROVIDE A REAL-WORLD EXAMPLE OF A DAY ON THE DESC SYSTEM WHEN SUCH SPIKES AND DROPS OCCURRED?**

A. Yes. **Table 1**[33] below provides an example from the summer of 2019 that illustrates not only the occurrence of such spikes and drops, but also how dramatically such intermittent generators can vary from forecasted generation due to factors such as their dependency upon weather.

**TABLE 1**




**Q. DO THESE SPIKES AND DROPS IMPACT OTHER GENERATORS?**

A. Yes, and the impact of this is exacerbated with the increased penetration of intermittent generation. These excursions cause cycling and ramping in other units that creates thermal and physical stresses that those units were not designed to

[33] This chart was first presented to the Commission in the Rebuttal Testimony of DESC Witness Thomas E. Hanzlik in Docket No. 2019-184-E (DESC's prior avoided cost docket).

address and they adversely affect the condition and the need for additional maintenance of those base load generators.

**Q. DOES DISTRIBUTION AND TRANSMISSION MAINTENANCE IMPACT GENERATOR PRODUCTION?**

A. Yes. Regardless of whether it is planned or unplanned, such maintenance may require isolation of assets, resulting in an outage or limited production of certain generation facilities. The location at which the energy is delivered to the grid by an intermittent generator can impact production and is determined solely by the QF. Although all generators have to coordinate maintenance with the utility, utility-owned generators are located and interconnected in a way that reduces the impacts of distribution and transmission maintenance on their output.

**Q. WHAT ARE THE POTENTIAL IMPACTS TO CUSTOMERS ARISING FROM OPERATING ISSUES?**

A. Depending on the relative size of these facilities, critical parameters such as voltage, current, and frequency can be forced outside acceptable operating limits, thereby negatively impacting residential customers as well as C&I customers hosting sensitive electronic systems. Another potential impact relates to shortfalls in production. These shortfalls will need to be offset by other generation assets and or market procurement that could expose customers to risk. For example, if these generators experience shortfalls, DESC would necessarily have to make up for that in some other manner given that DESC planned for such generation in its supply plan. However, the very nature of these shortfalls means that DESC would have to take actions in the short-term to offset such shortfall, and those actions may not necessarily be the most economical. Additionally, power quality problems from inverters and switches on the DESC system can and have negatively impacted customers. These problems are typically manifested through significant voltage variations and complaints of flickering lights. DESC also incurs additional expenses as a result of such issues.

**Q. WHAT IS TYPICALLY NEEDED TO RESOLVE THESE OPERATING ISSUES?**

A. The operating issues described above often require extensive engineering resources on behalf of the buyer and seller, particularly if these issues are only addressed after they occur, rather than in a preventative fashion. In some cases, costly and extensive asset investments are required. This is not only true of these QF generators, but also of DESC's system as well. As a result of that proactive maintenance and corresponding investment, DESC has seen a measurable improvement in reliability, which has resulted in reliability metrics that are far better than the industry average. DESC attributes its improvement to a reliability-focused maintenance philosophy. This philosophy is centered around a mix of corrective maintenance, targeted capital investments and improvements, and on-going preventive and predictive maintenance activities. As such, whether it be a QF's facility or the DESC system, continued investment and appropriate maintenance are necessary to address and avoid potential operating issues. This is important because these issues can negatively impact the system or other customers, which could result in extended downtime for such asset until a viable solution can be proposed and implemented. Independent developers should commit to make the same investment in maintenance.

**Q. PLEASE PROVIDE A BRIEF EXPLANATION OF ACTUAL ISSUES DESC HAS EXPERIENCED WITH SOLAR QFs AND THE ASSOCIATED CHALLENGES.**

A. DESC began experiencing problems in 2017 when an industrial plant adjacent to a 10 MW QF started experiencing process interruptions and production losses. DESC engineers investigated and discovered that the plant's sensitive loads were being disrupted due to the switching of transformers in the adjacent solar farm. DESC made some system modifications and worked with the seller to minimize the impact of the QF transformer switching.

In 2018, DESC investigated several complaints of flickering lights in the low country area and tracked the problem down to a 20 MW QF interconnected to the DESC 46 kV sub transmission system. This problem ultimately was due to unstable operation of the synchronization function of the inverters. While dealing with the ongoing issues of this particular QF, DESC began to monitor two other sites that were similar in size and utilizing the same type of inverters and determined that these facilities were also experiencing stability issues and were also the source of customer complaints. After many unsuccessful attempts to resolve the issue with the inverter manufacturer, the QF procured the assistance of a subject matter expert that was able to identify the root cause and recommend inverter controller upgrades.

In 2019, DESC experienced similar customer complaints and voltage flicker alarms from a 39 MW QF. This facility had very similar inverter control issues that took many iterations to resolve while compromising the quality of service to other customers with each unsuccessful attempt to correct the issue. Like the previously-mentioned stability related problems, this facility was causing significant voltage fluctuations on the DESC system resulting in flickering lights. Ultimately, the QF hired a firm that identified the root cause as temperature-related component failures within the inverters. Additionally, these complaints were also traced to a 6 MW QF in the same area. This 6 MW plant was also experiencing inverter synchronization problems that required inverter modifications and upgrades to correct the stability issues causing voltage fluctuations on the DESC system.

**Q. IS DESC PROPOSING MEASURES IN THIS DOCKET TO ADDRESS THESE OPERATING ISSUES?**

A. Yes, and DESC Witness Folsom will describe those changes in greater detail. However, at a high level, DESC is proposing several revisions to both the Form PPA and the Standard Offer aimed to ensure that QF generators operate in a way that permits DESC to maintain the safety and reliability of the DESC system, while also ensuring contractual risks to ratepayers are mitigated. For example, DESC's proposed revisions to Section 3.5 of the Standard Offer and Form PPA require that any QF experiencing a shortfall in the required energy production during any year must submit a report to DESC and the ORS detailing the cause of such shortfall and how it plans to avoid similar shortfalls going forward. DESC finds it appropriate to provide the report to the ORS given that its mission is centered upon the "using and consuming public"—the same customers which the shortfall provision seeks to protect. This mechanism is necessary because DESC must accurately plan its reliability and resource needs—which are based, in part, upon the production levels agreed-upon at the time of contracting.

The proposed revisions to Section 5.1(a) of the Form PPA and the Standard Offer contain a mechanism aimed to ensure the safety and reliability of the DESC system, which necessarily benefits its customers. Under Section 5.1(a), if a QF's facility creates "recurring power quality issues or other issues that disrupt normal operation" of DESC's transmission or distribution system, then DESC will notify the QF of such conditions. Upon notice, the Form PPA and Standard Offer provide the QF with a period of 8 months to address and remediate such issues. As described by DESC Witness Folsom, this language was included in a PPA that was recently executed and filed with the Commission, and provides appropriate parameters to ensure that DESC can operate its system safely and reliably.

These protections will operate in conjunction with the existing customer protections in the Form PPA and Standard Offer—which include design and construction requirements, performance guarantees, and liquidated damages. As described above and echoed by Act No. 62, DESC aims to ensure that risks to its customers and its system are mitigated.

**Q. DO THESE CONSUMER PROTECTION MEASURES TREAT SOLAR QFs DIFFERENTLY THAN DESC-OWNED GENERATION?**

A. No. If a DESC-owned generator is causing operating issues on the DESC system, similar—and often more stringent—expectations and requirements to resolve the issue exist and would be implemented. In fact, DESC has additional obligations related to performance that these QFs do not have given that DESC is regulated in a way that these generators simply are not. For example, DESC is subject to regulation by the North American Electric Reliability Corporation ("NERC"). NERC is designated by Congress to enforce mandatory electric reliability standards implemented by the FERC. These standards apply to all aspects of electric service from transmission planning to generator operations, and include very prescriptive measures with which DESC must comply. In addition to these regulatory obligations, specific to South Carolina is the ORS, which represents the "using and consuming public" and has certain statutory rights granted by the General Assembly that enable it to obtain information from DESC on a variety of topics, including performance of its fleet. As such, the consumer protection measures mentioned above were designed, in part, to better allow DESC to meet these additional regulatory obligations that do not apply to QF generators.

## MITIGATION PROTOCOLS

**Q. PLEASE BRIEFLY EXPLAIN WHY THE VIC (VARIABLE INTEGRATION CHARGE) IS NECESSARY.**

A. As DESC has proven in past proceedings before the Commission, DESC's customers incur additional costs as a result of intermittent solar QFs on the DESC system. In Order No. 2019-847, the Commission held that the imposition of integration charges[34] (the "Integration Charges") in an interim amount of \$2.29/MWh was "just and reasonable to customers, consistent with PURPA and FERC regulations and orders, non-discriminatory to QFs, and serve[s] to reduce the risk placed on the using and consuming public."[35] Although the initial value of \$2.29/MWh was reduced by the Commission in Order No. 2020-244, the

[34] The Commission ordered the imposition of an EIC and a VIC. The difference between the VIC and EIC is largely administrative, as both attempt to recover similar costs. The EIC is currently factored into DESC's avoided cost methodology, while the VIC is meant to collect such costs under certain existing power purchase agreements with rates that do not account for such costs.
[35] Order No. 2019-847 at 56, issued on December 9, 2019, in Docket No. 2019-184-E.

Commission held that the imposition of Integration Charges at such initial value was "supported by the evidence of record."[36]

These solar QF generators create added reliability concerns and issues on the DESC system, which require DESC to maintain additional operating reserves to ensure reliability and guard against the possibility of an unacceptable shortfall in such reserves. The additional reserves ensure that DESC is prepared for these large, unplanned drops in generation such that DESC's overall ability to reliably serve customers and balance the DESC system is not adversely affected. However, maintaining these reserves necessarily means that DESC incurs costs. To prevent DESC's customers from being responsible for those costs, DESC charges these costs to the generators necessitating such costs via Integration Charges.

**Q. PLEASE BRIEFLY EXPLAIN HOW GENERATORS CAN MITIGATE OR REDUCE INTEGRATIONS CHARGES APPLICABLE TO SPECIFIC QF GENERATORS.**

A. As DESC Witness Bell describes in greater detail, DESC has proposed certain Mitigation Protocols (the "Mitigation Protocols") in Docket No. 2019-184-E that could be utilized by a QF to mitigate or reduce this charge completely if such QF achieves certain operational characteristics.

[36] Order No. 2020-244 at 4, issued on March 24, 2020, in Docket No. 2019-184-E.

At the outset, any solar QF desiring to reduce or eliminate Integration Charges owed to DESC must first reduce or eliminate the need for DESC to carry additional operating reserves as a result of such QF's generation. To do this, such QF must reduce the magnitude of these unplanned drops in generation and provide a "smoother" generation profile. As such, the Mitigation Protocols, as well as any future mitigation measures, will provide a reduction in Integration Charges that corresponds to the degree QFs are able to mitigate the magnitude of these unplanned drops in generation.[37] If a QF does achieve reduction or elimination of the Integration Charges during an applicable month, such amount will be reflected in the invoice for such month under the Form PPA or Standard Offer. The Mitigation Protocols remain pending before the Commission.

**Q. WHICH GENERATORS ARE ELIGIBLE FOR THE MITIGATION PROTOCOLS?**

A. The Mitigation Protocols are optional and will be available to solar QFs that wish to mitigate Integration Charges under DESC's Form PPA or Standard Offer. Once approved, DESC will incorporate the Mitigation Protocols as an attachment to eligible Form PPAs and Standard Offers executed thereafter.

[37] DESC is also analyzing other mitigation options, including, but not limited to, the addition and deployment of DESC-owned assets to reduce variability on the DESC system. Based on information currently available, deployment of DESC-owned assets offers a meaningful way to fulfill the policy objectives of Act No. 62, while also providing mitigation for Integration Charges and maintaining reliability.

**Q. CAN ENERGY STORAGE SYSTEMS BE USED TO REDUCE THE INTEGRATION CHARGES APPLICABLE TO INTERMITTENT QFs?**

A. Yes, if they are operated in a way that addresses or mitigates DESC's need to maintain additional operating reserves.

## ENERGY STORAGE UNDER PURPA

**Q. PLEASE EXPLAIN DESC'S EFFORTS TO INCORPORATE ENERGY STORAGE INTO THE DESC SYSTEM.**

A. As discussed above, DESC is evaluating how emerging technologies can be utilized within the DESC to provide value to its customers. An important part of those efforts is DESC's storage tariff that was approved by the Commission in Order No. 2020-552 on August 18, 2020 (the "Storage Tariff"). To date, DESC has contracted for 18 MW of energy storage capacity under the Storage Tariff. As I mentioned above, it is crucial that emerging technologies be utilized in a way that provides value to the DESC customers. The Storage Tariff reflects this principle because it requires that the energy storage devices under the tariff operate in accordance with DESC's dispatch instructions and are capable of delivering power at the maximum discharge rating for four consecutive hours when fully charged. This ensures that the asset is optimized in a manner that benefits the DESC system, and that resulting value is reflected in the rates under the Storage Tariff.

**Q. CAN ENERGY STORAGE SYSTEMS QUALIFY AS A QF UNDER PURPA?**

A. Yes. Energy storage may be a transmission asset, a distribution asset or a generation asset. However, the storage technology, on its own, does not qualify the asset as a QF, but the storage system is eligible to obtain QF status provided the fuel used to generate the energy that is placed into the energy storage system complies with PURPA's fuel source restrictions.

**Q. IS AN ENERGY STORAGE QF SUBJECT TO PURPA'S 80 MW SIZE LIMITATION?**

A. Yes. The storage QF, like a QF generator, may not deliver more than 80 MW onto the grid at the point of interconnection.

**Q. IF DESC EMPLOYS ENERGY STORAGE, IS IT SIMILARLY LIMITED BY PURPA'S 80 MW LIMITATION?**

A. No. DESC is subject to regulation as a utility. DESC therefore cannot and does not seek to utilize the benefits of PURPA and is not therefore subject to PURPA's size and fuel source restrictions. DESC can develop, own and operation a storage system of any size—the key would be that DESC would need to develop it to reliably and economically meet a customer or system need.

**Q. DOES PURPA PLACE FUEL SOURCE LIMITATIONS UPON ENERGY STORAGE SYSTEMS AS WELL?**

A. Yes. As I stated above, with a QF facility, the storage facility must still comply with the fuel source limitations arising under PURPA. To comply with federal regulations, a QF energy storage resource is essentially limited to a particular QF generating facility or generators to which it is directly connected given the renewable fuel requirements under PURPA. If a storage facility is not seeking QF status, there is no fuel source limitation just as there is not size limitation.

**Q. IS DESC SIMILARLY LIMITED IN ITS ABILITY TO CHARGE A ENERGY STORAGE SYSTEM IT MAY OWN?**

A. No. If DESC owns the energy storage system it can be more broadly deployed because it may be charged with energy regardless of PURPA's fuel source restrictions. DESC can take energy directly from the DESC grid and place it into an energy storage system without the limitations of PURPA restrictions. This is important because this allows DESC to use energy storage it owns broadly for its customers and its system—with the flexibility to use renewable and non-renewable energy as it sees fit. This would be similar to the system benefit derived from

DESC's operation of Fairfield Pumped Storage—which operates like a storage facility, without fuel restrictions, only with an eight-hour discharge duration.[38]

**Q. DISCUSS HOW THE INCREASE IN VARIABLE RESOURCES ON THE DESC SYSTEM IMPACTS THE NEED AND USE OF ENERGY STORAGE.**

A. As the penetration of variable generation increases, the need for energy storage—particularly storage systems that have the capability to be dispatched for longer periods of time—increases as well. The challenge is that as the duration of storage increases, so do the costs.

**Q. DOES DESC HAVE ANY PLANS TO INCORPORATE DESC-OWNED STORAGE INTO THE DESC SYSTEM?**

A. DESC included storage as a candidate resource in the Integrated Resource Plan and coal Retirement Study preparation. Storage is a key piece of the renewable energy future and hundreds of megawatts of installed capacity are likely to be prudent additions to the already-existing 576 MW of pumped-hydro energy storage at DESC's Fairfield Pumped Storage facility. Current storage technologies cannot cost-effectively meet the Fairfield Pumped Storage's eight-hour discharge duration, which brings significant value and operating flexibility to the DESC system.

[38] The longer the discharge duration, the greater the benefit to the DESC system. For example, DESC likely derives greater benefit from Fairfield Pumped Storage than it would from energy storage systems with a four hour discharge duration.

However, current commercially-viable energy storage resources with a more limited discharge capability of 4 hours would also have a positive impact on the DESC system as cost continues to drop. DESC ownership and operation of these assets would provide additional benefits, such as greater energy-shifting opportunities and more informed operations through the dispatch planning process.

**Q. PLEASE EXPLAIN HOW ADDITIONAL DESC-OWNED STORAGE MAY HAVE MITIGATED THE SITUATION DESCRIBED ABOVE, WHICH OCCURRED ON JANUARY 28TH, DURING WHICH DESC HAD TO DEVIATE FROM ECONOMIC DISPATCH ORDER AND BACK ITS GENERATION DOWN.**

A. First, understand that DESC can deploy energy storage as a transmission asset, a distribution asset, or a generation asset to best address its system needs. This allows DESC to consider system needs, customer needs and deploy assets best designed to meet those needs. Where DESC deploys storage as a generation asset, DESC has added flexibility in terms of its ability to supply power to the energy storage device, regardless of fuel source. Additionally, DESC may choose the size of the energy storage system necessary to address system needs and is not limited to PURPA's size limitations.

As it relates to the January event, additional DESC-owned or -operated storage could have offered additional operating flexibility by delivering excess solar energy into the energy storage system to mitigate curtailment risk. However, importantly, DESC could have also opted to deliver non-renewable energy into the energy storage system and continue the flow of the solar power onto the DESC system to similarly mitigate the curtailment risk. This simply illustrates the flexibility provided to DESC because—unlike QFs—DESC does not have restrictions on the type of fuel source it utilizes to charge energy storage systems. Additionally, DESC-owned or –operated energy storage systems are not subject to PURPA's size limitation—keep in mind, DESC has identified 700 MW of energy storage in its latest IRP. All of this allows DESC to better manage energy during the day and possibly would have mitigated the curtailment risk on January 28th, at the very least.

## CONCLUSION

**Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

A. Yes.